

CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

WALTER M. DICKIE, M.D., Director

Weekly Bulletin



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GUY P. JONES
EDITOR

Why Epidemics

(Continued from last issue)

Infection as viewed from the standpoint of the naturalist is analogous to or identical with the biological phenomena of parasitism so widely existent throughout the animal and plant kingdom. The parasites, macro- or microscopic or invisible, live on or within their respective hosts while the injury to the host, the disease of man or animals, is quite secondary. It is incidental and therefore not necessarily a part of the infection. Until quite recently the medically oriented microbiologist approached the infectious disease not from the standpoint of the agent but rather he placed in the foreground of his observation and action the altered state of the host. With the recognition of the so-called *latent infections* and the *infections without an infectious disease*, this strictly utilitarian concept was found untenable. Today these latent infections familiar to the layman as the so-called "carriers of bacteria" are commonplace processes. It is well to recall that their original discovery in man during the cholera epidemic at Hamburg in 1891 created memorable consternation since the prevailing ideas made the existence of a "pathogenic microbe" in the body of a healthy human being inconceivable. Disease-producing action was considered at that time the medically important integration of parasite and host. What remarkable changes have taken place!! Practically every important disease displays either as a stage or during its entire course a symptomless exist-

ence. In malaria, relapsing fever and certain septic processes, periods of latency alternate with those of obvious manifest disease. On the other hand, the so-called "quiescent" infections such as tuberculosis and leprosy long remain unrecognized on account of their tendency of latency.

For many years, those who studied in the temperate zones the newly discovered undulant fever disease made the intriguing observation that a fairly large percentage of persons, who had been exposed to the risk of infection with the *Brucella* organisms specifically associated with this malady, would reveal in their blood serum specific antibodies. Clinical undulant fever was quite infrequent in these occupational groups despite their intimate contact with infected live stock. Various explanations were offered but not until a skin test, in many respects similar to the tuberculin test, had been developed was it possible to prove or disprove the interpretation of these epidemiologic data. Systematic allergic skin tests with the protein prepared from the *Brucella* organisms on large groups of employees in slaughtering establishments disclosed the fact that all those who gave positive reactions failed to contract the disease. A painstaking scrutiny of the past history of these people revealed no evidence of any sickness even remotely resembling undulant fever. Students, who gave definite skin reactions, had during their studies spent

a considerable time in the slaughterhouses handling the viscera of hogs in the search for various parasites. There is now available a great deal of experimental evidence to prove that the *Brucella* bacteria present in the organs of cattle and hogs rather frequently infect persons who are exposed by contact. These infections generally remain latent; their occurrence past or present can be detected only by these refined methods of examination.

On the African continent yellow fever operates entirely as a latent infection. Members of the Rockefeller Foundation found that when the blood serum of recovered patients is mixed with the brain substance of mice infected with the yellow fever disease agent and then inoculated into normal monkeys or mice, as a rule, these animals survived. This protection is a definite indication that previously the patient had been infected with the disease. Employing this method, the investigators have been able to detect the existence of yellow fever in villages where no obvious signs of the disease were present. The infections were inapparent and without the manifest clinical signs of yellow fever. Many more examples from an endless chain could be cited to stress a fact which is rarely appreciated in its proper perspective.

The biologic definition as presented answers the pertinent inquiry concerning the *primary origin of the infections* as identical with the *genesis of parasitism*. Ultimately every parasite has descended from an independent free living organism through predatory habits to a state of perfect adaptation in a host. The final process of being adapted so eminently imprinted on the parasites in the form of structural and functional adjustments precludes an independent existence. Moreover, a great many parasitic species possess as a phylogenetic relic of their original autonomy the vitality to exist outside of the host either during their entire life cycle or at least during certain of its phases. *Finally, the most convincing and decisive argument has been furnished by the experimental transformation of free living organisms into obligative or at least facultative parasites.* Thus far, medical microbiology has not succeeded in producing a positive transformation in a convincing or irrefutable manner. Claims must be carefully scrutinized for atavistic reversions. One must continue to adhere to the postulate that only microorganisms are chosen which in former generations have not led a parasitic existence. However, the studies on symbiosis have furnished encouraging leads. In particular, the artificial synthesis of the symbiosis of Algae in paramecia fulfills all the prerequisites of the postulate. Oehler, Pringsheim, Goetch and others succeeded in

separating and then recreating the symbiosis in paramecia, hydra, rhizopoda, etc. Dependent on whether their habitat is in fresh or in sea water, the endoplasm of these organisms may become occupied by *Chlorella* or *zooxanthella*. A separation of the partners of this type of symbiosis may be achieved and each may be cultivated independently of the other. However, this separation is no easy task and the many painstaking experiments which have been carried on attest to the *striking tenacity* with which the Algae may adhere to the host.

Various gradations of intimacy may be noted in one and the same species. Far more important than the separation of the plant from the animal is the *causation of the symbiosis*. One of the most important discoveries made leaves no doubt that the *immunity of the Algae* against the enzymes of the digestive vacuoles is of prime importance. As Pringsheim has demonstrated, it may be an inherent property of the Algae or it may be acquired within a few weeks. Certain Algae, despite systematic exposure to the invertebrate, remain susceptible. Equally significant and far reaching in the interpretation of the problems of infections is the regulatory mechanism of the animal partner which controls the growth rate of the invaded Algae. Without this factor, the immune plant would readily overwhelm the animal as a parasite. Aside from this mechanism, one encounters as another host factor the *disposition* to accept the Algae as a parasite or a "symbiont". Certain species of Hydra freed from Algae receive the plants and become green, but within 10 to 14 days expel them just like ordinary food particles. In other cases, the fresh-water polyps are injured but following a massive and stormy multiplication and expulsion of clouds of Algae, they ultimately recover. This form of *elementary parasitism* reveals a remarkable analogy with the invasion of man and animals by unicellular plants. Further experiments indicate that *the animal partner is, in a manner as yet unknown, profoundly impressed by a preceding relationship with Algae. This property manifests itself in a greater receptivity.* Finally, the host parasite-symbiont factors are rendered complex by the formation of physiologic races or types, morphologically indistinguishable but non-acceptable to the actinizoon or protozoon.

These deliberate experimental reconstructions of the intimate integrations between heterologous organisms clearly exposes the pathways which may be chosen to unravel the secrets of parasitogenesis. In this connection, it may be emphasized that these dissections of the elementary host-parasite relationship conclusively disprove again the fantastic hypotheses of Por-

tier and Wallin, who claimed that life in its simplest cellular structure is a symbiotic complex. If this concept should be true, then every effort to elucidate the incipient stages of parasitism would be a purposeless undertaking.

In the model of the Algae infection, the host is on a low level of organization. However, from the amoeba ascending to the highly developed man, the ability to accept parasites progressively increases. As a rule, the parasites vary in accordance with the species relationship of the respective hosts. With the advanced organization of the hosts, the number and variety of the parasites, which attack them, correspondingly increases. Although no exact comparative tabulations are available, the recently published list by F. B. Gay of 742 diseases of man induced by animate agents represents the maximum of parasitism thus far observed in the animal kingdom. Finally, one and the same parasite inhabits closely related species of animals and plants; thus the asexual developmental stages of the malarial parasites may reside in the red blood corpuscles of man and the anthropoid apes (Reichenow and others), while the sexual forms develop in the stomach of the *Anopheles*. The protein virus of the tobacco mosaic disease has been transferred to a number of Solanaceae. Many other only partially recognized or poorly outlined phenomena of adaptation, particularly in the field of pathogenic protozoa, *Spirochaetes*, *bartonellae*, *rickettsia*, viruses and less so among the bacteria and fungi, dimly sketch an evolution in the history of parasitism. Doerr, who has critically analyzed and carefully collected supporting data, succinctly designates this development as the *phylogenesis of disposition*. Hypothetically, it is now suspected that already during the early phases of organic life, the phenomenon of infection left indelible marks. As general or even specific disposition to certain parasites, these effects survived the ascending integrations of the hosts. That such impressions induced by a previous infection really exist may be experimentally demonstrated. In fact, the artificial synthesis of the Algae symbiosis previously mentioned offers a number of concrete examples. It is not unlikely that the increased disposition or so-called "specific acceptability of Zironi" for the *Staphylococcus*, *Streptococcus* and *Pneumococcus* so frequently seen in the field of human pathology may well serve as illustrations of a general principle. Clinical experience merely records that erysipelas of the face frequently enhances the chances for repeated attacks. An explanation of the habitual erysipelas or the tendency to carbuncles, with definite familial persistence, has never been offered and is dismissed with the meaningless negative

statement that recovery from this and similar infections leaves no immunity. Future investigations must of necessity inquire into the conditions which enable the agent to localize and to invade a host. Such an undertaking may not succeed in explaining the polyspecific susceptibility of man and higher animals, aided by the plasticity and adaptability of the parasites, without conceding a third factor; that is, the transfer of the disposition from the ancestors to the descendants. Independent of the somatic state of the host, these dispositions have developed under the influence of the parasitism the perfection they reveal today.

(Continued in next issue)

SAN DIEGO GIRL WINS GORGAS PRIZE

Janet Allen of the Point Loma High School, San Diego, has won the State prize in the Gorgas Memorial Essay Contest sponsored by the Gorgas Memorial Institute of Washington, D. C.

The judges of the national contest are now considering the forty-eight manuscripts which represent the winners in the State contests. From among those, there will be selected the national winner, who will receive \$500 with an added \$200 travel allowance for expenses of a trip to Washington to receive the prize which will be presented by the President at the White House.

This annual contest is open to high school students throughout the United States and is effective in stimulating continued interest in the control of tropical diseases, chiefly malaria and yellow fever.

MUSSELS UNDER QUARANTINE

A quarantine of all mussels from the ocean shore of California extending from the southern boundary of Los Angeles County north to the California-Oregon boundary with the exception of the bay of San Francisco, is hereby established.

All health officers and food inspectors are hereby instructed to enforce the provisions of this quarantine and to prohibit the taking, sale, or offering for sale, of mussels gathered in the district specified. This quarantine order shall be effective for the period June 1, 1937, to September 30, 1937.

Said action is taken for the preservation of the public health.

W. M. DICKIE, M.D.,
Director of Public Health

The cultivation of an outside interest or hobby is just as important if not more important to a person's well being than the mere acquisition of knowledge.

MORBIDITY

Complete Reports for Following Diseases for Week Ending
June 5, 1937

Chickenpox

697 cases: Alameda 24, Albany 8, Berkeley 71, Oakland 19, Contra Costa County 13, Pittsburg 3, Richmond 1, Fresno County 2, Fresno 4, Reedley 1, Kern County 5, Taft 3, Hanford 3, Susanville 1, Los Angeles County 39, Alhambra 3, Beverly Hills 4, Burbank 3, Compton 3, Culver City 4, Glendale 4, Huntington Park 2, Long Beach 17, Los Angeles 105, Monrovia 3, Pasadena 13, Redondo 1, Santa Monica 8, Sierra Madre 5, South Pasadena 1, Whittier 4, Hawthorne 7, Monterey Park 1, Maywood 1, Bell 1, Marin County 1, Mill Valley 6, Monterey County 1, Monterey 1, Orange County 25, Anaheim 4, Fullerton 1, Newport Beach 1, Orange 3, Santa Ana 10, Rocklin 1, Riverside County 9, Riverside 1, Sacramento County 28, Sacramento 19, San Bernardino 2, San Diego County 7, National City 7, San Diego 45, San Francisco 50, San Joaquin County 1, Lodi 1, Stockton 7, San Luis Obispo 4, San Mateo County 3, Burlingame 1, Daly City 4, South San Francisco 1, Santa Barbara County 5, Santa Barbara 6, Santa Clara County 7, Palo Alto 3, San Jose 10, Santa Clara 1, Sunnyvale 1, Santa Cruz 4, Redding 2, Vallejo 1, Stanislaus County 7, Tulare County 2, Lindsay 9, Ventura County 7, Yolo County 1.

Diphtheria

23 cases: El Centro 1, Kern County 1, Los Angeles County 1, Los Angeles 9, Lincoln 1, Riverside County 1, Sacramento 1, San Diego 1, San Francisco 1, San Joaquin County 1, Santa Barbara 2, Ventura County 2, Riverside 1.

German Measles

22 cases: Alameda 2, Berkeley 3, Humboldt County 1, Los Angeles County 1, Glendale 1, Los Angeles 8, Pomona 1, Riverside 2, San Francisco 2, Healdsburg 1.

Influenza

78 cases: Kern County 23, Los Angeles County 3, Long Beach 1, Los Angeles 5, Whittier 3, Hawthorne 6, Placer County 3, Auburn 3, Rocklin 21, Riverside County 1, San Joaquin County 1, San Luis Obispo County 2, Tulare County 2, Lindsay 4.

Malaria

2 cases: Pomona 1, Sutter County 1.

Measles

379 cases: Oakland 3, Fresno 1, Humboldt County 2, Imperial County 1, Kern County 11, Los Angeles County 4, Glendale 10, Long Beach 13, Los Angeles 30, Montebello 1, Lynwood 1, Mariposa County 5, Napa 1, Orange County 9, Anaheim 3, Santa Ana 3, Placer County 1, Auburn 10, Rocklin 13, Plumas County 2, Riverside County 6, Corona 40, Riverside 2, Sacramento County 93, Sacramento 34, Ontario 1, San Diego County 3, El Cajon 19, National City 1, San Diego 3, San Francisco 9, San Luis Obispo County 1, Santa Barbara County 1, Sierra County 17, Dunsmuir 1, Modesto 1, Turlock 1, Yuba City 5, Tulare County 3, Ventura County 3, Yolo County 1, Yuba County 10.

Mumps

601 cases: Alameda County 2, Alameda 4, Albany 1, Berkeley 32, Oakland 9, Butte County 1, Contra Costa County 6, Pittsburg 3, Richmond 4, Fresno County 3, Fresno 4, Humboldt County 1, Imperial County 1, Bishop 8, Kern County 17, Hanford 9, Los Angeles County 65, Alhambra 3, Arcadia 3, Beverly Hills 1, Compton 5, Covina 3, Glendale 6, Huntington Park 3, Long Beach 6, Los Angeles 50, Manhattan 6, Monrovia 12, Pasadena 6, San Gabriel 1, Santa Monica 17, South Pasadena 1, Lynwood 3, Hawthorne 12, South Gate 1, Monterey Park 1, Maywood 1, Madera County 1, Madera 6, Mill Valley 39, Monterey County 1, King City 1, Orange County 13, Anaheim 1, Brea 1, Fullerton 13, Huntington Beach 1, Orange 2, Santa Ana 1, Placentia 2, Auburn 1, Rocklin 2, Riverside County 4, Hemet 2, Riverside 8, Sacramento County 3, Sacramento 2, San Bernardino 1, San Diego County 8, El Cajon 1, National City 6, San Diego 55, San Francisco 53, San Joaquin County 2, Stockton 1, San Mateo County 2, Daly City 8, Santa Barbara County 3, Lompoc 2, Santa Barbara 6, Santa Clara County 1, Palo Alto 2, San Jose 14, Turlock 1, Trinity County 1, Lindsay 1, Ventura County 17, Yolo County 1.

Pneumonia (Lobar)

52 cases: Albany 1, Oakland 1, Calaveras County 1, Imperial County 1, Los Angeles County 4, Azusa 1, Huntington Park 1, Long Beach 1, Los Angeles 10, Pasadena 3, San Fernando 1, Maywood 1, Merced County 2, Orange County 1, Rocklin 1, Sacramento County 1, San Diego 1, San Francisco 4, San Joaquin County 5, Lodi 1, Stockton 1, Tracy 3, San Luis Obispo County 1, Santa Barbara County 1, Los Gatos 1, Palo Alto 1, San Jose 1, Exeter 1.

Scarlet Fever

215 cases: Alameda County 1, Berkeley 2, Oakland 6, San Leandro 1, Butte County 3, Contra Costa County 4, Richmond 2, Fresno County 5, Glenn County 2, Humboldt County 2, Kern County 9, Bakersfield 2, Susanville 1, Los Angeles County 12, Alhambra 1, Compton 1, Culver City 1, Inglewood 1, Long Beach 4, Los Angeles 35, Monrovia 1, San Fernando 1,

Whittier 1, South Gate 1, Maywood 1, Madera County 1, Madera 1, Merced County 5, Monterey County 3, Monterey 1, Pacific Grove 4, Salinas 2, Placer County 1, Auburn 3, Rocklin 28, Plumas County 1, Riverside County 2, Hemet 1, Riverside 3, Sacramento County 5, Sacramento 3, San Diego County 2, La Mesa 1, San Diego 1, San Francisco 17, San Joaquin County 2, San Luis Obispo County 2, San Mateo 2, Santa Barbara County 1, San Jose 2, Santa Cruz 2, Watsonville 1, Dunsmuir 2, Benicia 1, Vallejo 2, Sutter County 1, Tehama County 1, Tulare County 4, Exeter 3, Lindsay 2, Yolo County 1, Woodland 2.

Smallpox

10 cases: Los Angeles County 1, Los Angeles 3, Riverside County 2, San Diego County 1, San Diego 2, Dunsmuir 1.

Typhoid Fever

11 cases: Oakland 1, Los Angeles County 1, Los Angeles 2, Madera 1, Monterey County 1, San Joaquin County 1, Yuba City 1, Tulare County 2, Yuba County 1.

Whooping Cough

563 cases: Alameda County 6, Berkeley 3, Oakland 8, San Leandro 1, Butte County 11, Oroville 4, Contra Costa County 3, Fresno County 10, Fresno 17, Imperial County 23, Kern County 10, Bakersfield 1, Taft 1, Hanford 5, Susanville 3, Los Angeles County 43, Alhambra 4, Arcadia 1, Beverly Hills 1, Burbank 1, Compton 2, Culver City 3, Long Beach 11, Los Angeles 89, Manhattan 1, Monrovia 6, Pasadena 20, Pomona 11, San Fernando 2, San Gabriel 2, Santa Monica 6, South Pasadena 7, Whittier 1, Torrance 2, Hawthorne 2, Monterey Park 1, Madera County 12, Ukiah 25, Merced County 1, Orange County 2, Anaheim 1, Fullerton 2, Orange 1, Santa Ana 2, La Habra 2, Plumas County 1, Riverside 4, Sacramento County 18, Sacramento 8, San Bernardino 3, San Diego County 3, San Diego 6, San Francisco 42, San Joaquin County 4, Lodi 2, Stockton 4, San Mateo County 5, Santa Barbara County 8, Santa Barbara 5, Santa Maria 2, Palo Alto 2, Santa Cruz 6, Newman 37, Red Bluff 2, Tulare County 18, Lindsay 1, Ventura County 9, Oxnard 3.

Meningitis (Epidemic)

4 cases: Humboldt County 1, Placer County 1, Hollister 1, Ventura County 1.

Dysentery (Amoebic)

4 cases: Kern County 1, Ontario 1, San Francisco 2.

Dysentery (Bacillary)

9 cases: Los Angeles.

Pellagra

2 cases: San Francisco 1, San Joaquin County 1.

Poliomyelitis

6 cases: Los Angeles County 2, Los Angeles 2, Merced County 1, Pacific Grove 1.

Tetanus

One case: Los Angeles.

Trachoma

6 cases: Los Angeles County 2, Los Angeles 1, Monterey County 1, Riverside County 1, Tehama County 1.

Beriberi

One case: San Francisco.

Dengue

One case: San Francisco.

Paratyphoid Fever

One case: San Francisco.

Rocky Mountain Spotted Fever

One case: Modoc County.

Jaundice (Epidemic)

2 cases: El Dorado County.

Food Poisoning

5 cases: Anaheim 2, Laguna Beach 2, San Francisco 1.

Undulant Fever

5 cases: Huntington Park 1, Los Angeles 1, Merced County 1, San Bernardino 1, San Francisco 1.

Rabies (Animal)

39 cases: Fresno 1, Kings County 3, Hanford 1, Los Angeles County 10, Long Beach 1, Los Angeles 18, Redondo 1, Santa Monica 1, Whittier 1, Signal Hill 1, Monterey County 1.